Claims

1. A material of the general formula $M_6C_yH_z$, wherein M designates a transition metal, C designates a chalcogen, H designates a halogen, and wherein y and z may be of from 0 to 10 such that $8.2<y+z<10$, grown in the form of nanowires, nano-ropes, nanorods, whiskers or needles and obtainable by a process comprising the steps of mixing the constituent elements in the desired mass ratio, placing them in an appropriate container, evacuating the container and heating it to a temperature above 1000 °C for a predetermined length of time.

2. The material according to claim 1, wherein M is a transition metal selected from the group consisting of Mo, W, V, Ti, Ta, Nb, Zn, Hf, Re and Ru.

3. The material according to claim 1 or 2, wherein M represents a mixture of two or more transition metals

4. The material according to preceding claims, wherein C = S, Se, Te.

5. The material according to preceding claims, wherein C represents a mixture of two or more chalcogens.

6. The material according any of the preceding claims, wherein the halogen H= I, Br, Cl or F.

7. The material according to preceding claims, wherein H represents a mixture of two or more halogens.

8. The material according to any of the preceding claims, wherein $0<y<10$, $0<z<10$ and $8.2\leq y+z<10$.

9. The material according to any of the preceding claims, wherein H may be replaced by an ion elected from the group consisting of elements in the groups III-VIII.

10. The material according to any of the preceding claims, additionally containing intercalated or interstitial ions, atoms or molecules, selected from the group consisting of alkali metals, alkaline-earth metals, transition metals, elements belonging to groups III-VIII and any organic donors or acceptors.

11. The material according to any of the preceding claims exhibiting a substantially circular cross-section.

12. The material according to any of the preceding claims, which is superconducting.

13. The material according to any of the preceding claims, which is metallic or semiconducting.

14. A method for the production of a material according to any of the claims 1 to 11, which comprises the steps of (i) mixing of the individual constituent elements, (ii) heating in a sealed container under reduced pressure, (iii) heating above a temperature of 1000 C or more for any duration of time.

15. The method according to claim 11, wherein the elements themselves are replaced by compounds of those elements such as MoS_2 for example.

16. Use of a material according to any of the preceding claims in electronic, chemical, optical or mechanical applications.

17. The use of a material according to any of the claims 1 to 13 as a catalyst in dry form or in suspension or as a catalytic component.

18. The use according to claim 16, wherein said use of said material is selected from the

group consisting of a use in a field-emission device, in a superconducting application, in a proximity-coupled network, in a quantum interference network, in devices incorporating said material in 2-, 3-, 4- or multi-terminal configuration, and a use for enhancing electrical, optical, magnetic, mechanical and tribological properties of polymers and glasses by incorporating said material in said polymers and glasses.

19. The use according to claim 16, said material being used as a lubricating agent, optionally in combination with one or more further compounds, in particular oils.

20. A method of varying the material characteristics of a material according to any of the claims 1 to 13, said method comprising the steps of
selecting composition parameters y and z, and/or
incorporating dopants or substituents in said material.

21. An electric device comprising
at least one material or material bundle arranged on a substrate, said material being a material according to any of the claims 1 to 13; and
at least one contact arranged on said substrate and passing over said at least one material or material bundle, said at least one contact being connected with or connectable to circuitry of the device.

22. The device of claim 21, said device detecting physical or chemical influences acting on said at least one material or material bundle and/or said at least one contact.

23. The device of claim 22, said device being adapted to detect physical or chemical influences selected from the group consisting of influences due to molecules attaching to and/or coming into contact with said at least one material or material bundle or said contact(s), light of different wavelengths, and mechanical influences.

24. A method of arranging a material according to any of the claims 1 to 13 in a electric device, said method comprising the steps of

arranging at least one material or material bundle on a substrate;
providing said at least one material or material bundle with one or more contacts, at least one of said one or more contacts being in connection with or connectable to circuitry of said electric device.

25. An array comprising
at least one material or material bundle, said material being a material according to any of the claims 1 to 13, said at least one material or material bundle being provided on a substrate, the length axis of said at least one material or material bundle extending essentially non-parallel to said substrate,
said at least one material or material bundle being provided with a molecule on the end distant from said substrate.

26. The array of claim 25, wherein said at least one material or material bundle is attached to said substrate or attached to a template arranged on said substrate.

27. The array of claim 25, wherein said molecule is attached via a particle, preferably via a gold particle, to said at least one material or material bundle.

28. Use of an array according to any of the claims 25 to 27 for detecting a binding of a molecule to said molecule provided on said at least one material or material bundle.

29. A method of arranging an array, said method comprising
providing at least one material or material bundle, said material being a material according to any of the claims 1 to 13,
arranging said at least one material or material bundle on a substrate or on a template on a substrate, the length axis of said material or material bundle extending essentially non-parallel to the surface of said substrate and/or said template on said substrate, and
attaching a molecule to the end of said at least one material or material bundle remote from said substrate.

30. Use of a material according to any of the claims 1 to 13 for electric applications, said material being connected to or integrated in electric circuitry.

31. Material according to any of the claims 1 to 13, said material being a nanowire, nanorope, nanorod, whisker or needle provided on one end thereof with a molecule.

32. Material according to claim 31, said material being a sensor.

33. Composition comprising a material according to any of the claims 1 to 13 and one or more materials selected from the group consisting of superconducting compound, lubricating compound, oil, polymer, glass, and gaseous compound.